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(54) DOUBLE SIDED FLEXIBLE METAL PLATED LAMINATE BOARD

(57)Abstract:
PURPOSE: To provide a double sided flexible metal plated laminate board which is excellent in heat resistance, connection reliability when the boards are laminated in multilayer, and mass-productivity and lessened in cost.
CONSTITUTION: A metal foil is laminated on both the sides of a polyimide film subjected to an adhesion treatment through the intermediary of an adhesive layer of polyimide adhesive agent whose glass transition point is a temperature of 200-250° C and which is formed as thick as 5-50% of the thickness of the polyimide film.

CLAIMS

[Claim(s)]
[Claim 1]A double-sided flexible metal tension laminate sheet having become both sides of a polyimide film in which adhesion treatment of both sides was carried out from polyimide system adhesives whose glass transition point is 200-250 **, and laminating a metallic foil to them via an adhesives layer whose thickness is 5 to 50% of the thickness of a polyimide film.
[Claim 2]The double-sided flexible metal tension laminate sheet according to claim 1 whose adhesion treatment of a polyimide film is plasma treatment.

DETAILED DESCRIPTION

Detailed Description of the Invention]
[0001]
[Industrial Application]This invention relates to the double-sided flexible metal tension laminate sheet excellent in the adhesive strength at the time of heat resistance and an elevated temperature, and the connection reliability at the time of multilayering.
[0002]
[Description of the Prior Art]A flexible metal tension laminate sheet is a substrate for flexible printed wiring boards.
In connection with the miniaturization of remarkable electronic equipment, and densification, it is used abundantly in recent years.
That it should correspond to this high density, both-sides-ization of the flexible metal tension laminate sheet is performed briskly, and also multilayering of four or more layers is also increasingly performed using a layer indirect adhesive.
[0003]However, the adhesives which use the conventional double-sided flexible metal tension laminate sheet are an epoxy system and acrylic.
Since the glass transition point is about 100-150 **, it cannot be said that the present demand is enough satisfied in characteristic sides, such as adhesive strength at the time of an elevated temperature, and solder heat resistance.
Although the lamination temperature of 170-200 ** took at the time of multilayering, since this temperature was the temperature exceeding the glass transition point of the conventional adhesives, there were problems, like a metallic circuit shifts by contraction of the adhesives

before and behind lamination, etc. Since the coefficient of thermal expansion of Z shaft orientations was as large as abbreviation $5x10^{-4}$/** after lamination, the double-sided flexible metal tension laminate sheet using the conventional adhesives was not suitable as the material which problems, such as being inferior to connection reliability, also have, and carries out detailed line formation, and a material which carries out the Kota stratification.

[0004]

[Problem(s) to be Solved by the Invention]In recent years, it is in the trend by which the thing of two-layer structure which does not use adhesives is used abundantly in an one side flexible metal tension laminate sheet. There was a means used as a double-sided flexible metal tension laminate sheet using the one side article of two-layer structure, and although the whole of each characteristic was good, there was a problem that a manufacturing cost was high, as the double-sided flexible metal tension laminate sheet was shown in the JP,3-205474,A specification. This invention is that a glass transition point uses the polyimide system adhesives which are 200-250 ** as adhesives which it was made in view of this situation, and are used for a double-sided flexible metal tension laminate sheet, It aims at providing the double-sided flexible metal tension laminate sheet which was excellent in heat resistance or the connection reliability at the time of multilayering, and also was excellent also in cost or mass production nature.

[0005]

[Means for Solving the Problem]A result of having examined wholeheartedly what this invention persons replace with acrylic of the former which caused characteristics degradation, or epoxy adhesive, When a glass transition point uses polyimide system adhesives which are 200-250 **, based on an attaining [said purpose] title and this knowledge, it came to complete this invention.

[0006]To namely, both sides of a polyimide film in which adhesion treatment of both sides was carried out as for this invention. A glass transition point consists of polyimide system adhesives which are 200-250 **, and a double-sided flexible metal tension laminate sheet, wherein thickness laminates a metallic foil via an adhesives layer which is 5 to 50% of the thickness of a polyimide film is provided.

[0007]Since it was high compared with a thing of the former [glass transition point / of adhesives], a double-sided flexible metal tension laminate sheet of this invention had few falls of adhesive strength with a metallic foil also in 200 **, and abnormalities were not accepted for more than 60 seconds by solder bath immersion which is 350 **.

[0008]this invention -- business -- **** -- a polyimide film -- ****** -- in order to secure dimensional stability, a low-thermal-expansion nature polyimide film which has a line coefficient of thermal expansion comparable as a conductor metal is used preferably. Although YUPI REXX S (made by Ube Industries, Ltd.), APIKARU NPI (made by Kaneka Corp.), etc. are mentioned as such a polyimide film, in 50-250 **, the following [$2.5x10^{-5}$] are preferably used for a line coefficient of thermal expansion. When a line coefficient of thermal expansion uses a polyimide film exceeding this, a rate of a dimensional change after circuit processing may become large, and connection reliability in a thermal cycling test may fall. As for thickness of a polyimide film, a 12.5-75-micrometer thing is usually used suitably.

[0009]Adhesion treatment is performed to both sides of this polyimide film. Methods of adhesion treatment include chemical preparation, such as mechanical processes, such as

brushing and sandblast treatment, coupling agent processing, alkali treatment, corona treatment, and plasma treatment. Oxygen plasma treatment is especially the most preferred from a field of an effect.

[0010]A metallic foil is laminated by both sides of a polyimide film of a double-sided flexible metal tension laminate sheet of this invention via an adhesives layer. This adhesives layer consists of polyimide system adhesives whose glass transition temperature is 200-250 **. The heat resistance of a double-sided flexible metal tension laminate sheet obtained as glass transition temperature of adhesives is less than 200 **, and connection reliability at the time of multilayering fall, and if it exceeds 250 **, adhesion of a polyimide film and a metallic foil will become difficult. As a metallic foil, 8-105-micrometer-thick copper foil is used suitably.

[0011]What imide-izes polyamide acid produced by making tetracarboxylic acid, such as benzophenone tetracarboxylic acid, etc. react to diamino compounds, such as 2,2-bis[4-(p-aminophenoxy) phenyl] propane, as polyimide system adhesives used by this invention, Or what blends and imide-izes bismaleimide compounds, such as N,N'-(methylene di-p-phenylene) bismaleimide, is mentioned to said polyamide acid.

[0012]The above-mentioned adhesives layer thickness is taken as 5 to 50% of thickness of thickness of a polyimide film. The connection reliability of a flexible metal tension laminate sheet which will be obtained if adhesives layer thickness exceeds 50% of thickness of a polyimide film falls. 5 to 30% of thickness of a polyimide film is used preferably. As this reason, a coefficient of thermal expansion of Z shaft orientations of polyimide system adhesives, although it is 6.1×10^{-5}/** and is small single or more figures in 50-250 ** compared with a conventional epoxy system and acrylic -- a metallic foil of copper or others, and until equivalent -- making it small, since it is difficult, When a rate that an adhesives layer in the whole insulating layer occupies increases, it is because Z shaft-orientations coefficient of thermal expansion of the whole insulating layer becomes large and poses a problem in respect of dimensional accuracy or connection reliability.

[0013]Formation of an adhesives layer of this invention applies a polyimide system adhesive composition to both sides of a polyimide film which carried out adhesion treatment uniformly, and ranks second to them, for example, is dried 200 ** 150 ** for 30 minutes for 10 minutes. It is made for each adhesives layer thickness after desiccation to turn into 5 to 50% of thickness by a ratio with a polyimide film of a base film. On a metallic foil, a polyimide system adhesive composition may be uniformly applied so that it may become the above-mentioned thickness.

[0014]Finally, a polyimide film and a metallic foil are bonded by thermo-compression via an adhesives layer. More than a glass transition point of adhesives is required for temperature in this case, and it is 240-260 ** preferably. It is not limited especially although more than 20 kgf/cm^2 of a pressure is preferred. There is no limitation in particular about time and a crimping method, and it determines, observing the actual characteristic. Continuation sticking by pressure by roll laminating is also possible, and it is dramatically useful.

[0015]A metallic foil tears off a double-sided flexible metal tension laminate sheet produced by performing it above, in 200 **, 0.8 or more kgf/cm and solder heat resistance are more than for 60 seconds at 350 **, and strength is excellent in adhesive strength at the time of heat resistance and an elevated temperature, and connection reliability at the time of multilayering.

[0016]

[Example]Hereafter, although this invention is explained in detail based on an example, this

invention is not limited to this.
It is a 2,2-screw, pouring 300 ml/m of dry nitrogen to the reaction vessel made from 601 stainless steel furnished with synthetic example 1 thermo couple, an agitator, a nitrogen suction opening, and a capacitor. [4-(p-aminophenoxy) phenyl] 4.20 kg of propane and 42.5 kg of N,N-dimethylacetamide were put in and stirred, and BAPP was dissolved. Cooling this solution at 20 ** or less using a water jacket, 3.30 kg of benzophenone tetracarboxylic acid is added gradually, the polymerization reaction was carried out, and ********** polyamide acid varnish was obtained.
[0017]It cooked at 80 ** until the rotation viscosity of this varnish became about 200 poise from the purpose which improves future coat workability. The polyamide acid currently generated in this varnish is 7.5 kg (15wt%). The glass transition temperature of the polyimide obtained from this polyamide acid was 245 **.
[0018]Subsequently, this polyamide acid varnish was cooled at 40 **, the addition dissolution of 3.00 kg of the N,N'-(methylene di-p-phenylene) bismaleimide which hits 40 weight sections to unvolatilized polyamide acid 100 weight section was carried out, and the polyimide system adhesive composition was obtained.
[0019]Oxygen plasma treatment is carried out to both sides of the polyimide film (the Ube Industries, Ltd. make, trade name UPILEX-S) of 125 micrometers of examples on pressure 0.1torr, the supplied power of 15 kW, and the conditions for processing time 5 seconds, The polyimide system adhesive composition compounded in the synthetic example 1 to both sides was applied so that the thickness after desiccation might be set to 10 micrometers, respectively, and it dried on 200 **/the conditions for 30 minutes for 150 **/10 minutes. The residual volatile matter in adhesives was 0.3 % of the weight.
[0020]next, the adhesive coated surface of the above-mentioned polyimide film and 35-micrometer copper foil (the Nippon Mining Co., Ltd. make.) The roughened surface of the trade name BHY was made to counter, a polyimide film and copper foil were piled up, it pressed on the lamination conditions of 40 kgf/cm^2 for 250 **/30 minutes, and double-sided flexible copper clad laminate was obtained. It tears off as a metallic foil and 1.2 kgf/cm and at least 200 ** of strength is 1.2 kgf/cm at a room temperature.
The adhesive strength fall at the time of an elevated temperature was not accepted, and abnormalities were not accepted by 350 ** and the solder bath examination for 3 minutes, either.

[0021]The polyimide system adhesive composition compounded in the synthetic example 1 to the roughened surface of copper foil (the Nippon Mining Co., Ltd. make, trade name BHY) of 235 micrometers of examples was applied so that the thickness after desiccation might be set to 10 micrometers, and it dried on 200 **/the conditions for 30 minutes for 150 **/10 minutes. The residual volatile matter in adhesives was 0.3 % of the weight.
[0022]next, the 25-micrometer polyimide film (the Ube Industries, Ltd. make.) which carried out oxygen plasma treatment to both sides on Example 1 and the conditions The double-sided oxygen-plasma-treatment side and adhesive composition spreading side of trade name UPILEX-S were made to counter, a polyimide film and copper foil were piled up, it pressed on the lamination conditions of 40 kgf/cm^2 for 250 **/30 minutes, and double-sided flexible copper clad laminate was obtained. It tears off as a metallic foil and 1.3 kgf/cm and at least 200 ** of strength is 1.2 kgf/cm at a room temperature.

Abnormalities were not accepted by 350 ** and the solder bath examination for 3 minutes, either.

[0023]Using epoxy / NBR system adhesives (the Hitachi Kasei Polymer Co., Ltd. make, trade name H-2766 glass transition temperature of 60 **) as comparative example 1 adhesive composition, 120 **/10 minutes, and lamination conditions were made into 170 **/60 minutes for the drying condition, and also the double-sided flexible metal tension laminate sheet was obtained like Example 1. Although it tore off as the metallic foil and strength was 1.5 kgf/cm at the room temperature, the metallic foil has exfoliated at 200 **. The metallic foil exfoliated also in a 350 ** solder bath examination.

[0024]The coating thickness of comparative example 2 adhesives was 30 micrometers, and also the double-sided flexible metal tension laminate sheet was obtained like Example 1. Although it tore off and abnormalities were not accepted to be also strength and a solder bath examination, the rate of a dimensional change was as large as -0.15%, and trouble was caused at the time of multilayering lamination. The coefficient of thermal expansion of Z shaft orientations produced the crack greatly with 8.0×10^{-5}/** at the time of a thermal cycling test (-65 **/30 minutes <-->125 **/30 minutes).

[0025]

[Effect of the Invention]According to this invention, the double-sided flexible metal tension laminate sheet which tore off at the time of an elevated temperature and was extremely excellent in strength and solder heat resistance can be provided. Manufacture of the flexible printed wiring board of the characteristic as for which after multilayering has high connection reliability and is low cost and which was excellent by this was attained.

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(54)【発明の名称】　両面フレキシブル金属張積層板

(57)【要約】

【目的】　耐熱性や多層化時の接続信頼性に優れ、更にコストや量産性にも優れた両面フレキシブル金属張積層板を提供する。

【構成】　両面が接着処理されたポリイミドフィルムの両面に、ガラス転移点が２００～２５０℃のポリイミド系接着剤からなり、厚さがポリイミドフィルムの厚さの５～５０％である接着剤層を介して、金属箔を積層してなる両面フレキシブル金属張積層板。

【特許請求の範囲】
【請求項１】　両面が接着処理されたポリイミドフィルムの両面に、ガラス転移点が２００～２５０℃のポリイミド系接着剤からなり、厚さがポリイミドフィルムの厚さの５～５０％である接着剤層を介して、金属箔を積層したことを特徴とする両面フレキシブル金属張積層板。
【請求項２】　ポリイミドフィルムの接着処理がプラズマ処理である請求項１記載の両面フレキシブル金属張積層板。
【発明の詳細な説明】
【０００１】
【産業上の利用分野】本発明は、耐熱性、高温時の接着力及び多層化時の接続信頼性に優れた両面フレキシブル金属張積層板に関する。
【０００２】
【従来の技術】フレキシブル金属張積層板は、フレキシブル印刷配線板用基板であり、近年顕著な電子機器の小型化、高密度化に伴い多用されている。この高密度に対応すべく、フレキシブル金属張積層板の両面化がさかんに行われており、更に層間接着剤を用いて４層以上の多層化も行なわれるようになってきている。
【０００３】しかし、従来の両面フレキシブル金属張積層板は、用いる接着剤がエポキシ系やアクリル系であり、そのガラス転移点は１００～１５０℃程度であるため、高温時の接着力、はんだ耐熱性等の特性面において現在の要求を十分満足させているとは言えない。更に、多層化時には１７０～２００℃の積層温度がかかるが、この温度は従来の接着剤のガラス転移点を超える温度であるために、積層前後における接着剤の収縮等により、金属回路がずれるなどの問題点があった。また、積層後においてもＺ軸方向の熱膨張係数が約５×１０$^{-4}$／℃と大きいため、従来の接着剤を用いた両面フレキシブル金属張積層板は接続信頼性に劣るなどの問題もあり、微細なライン形成をする材料、高多層化する材料として適当なものではなかった。
【０００４】
【発明が解決しようとする課題】近年、片面フレキシブル金属張積層板においては、接着剤を用いない２層構造のものが多用されるすう勢にある。両面フレキシブル金属張積層板においても特開平３－２０５４７４号明細書に示されているように、２層構造の片面品を用いて両面フレキシブル金属張積層板とする手段があり、各特性は全て良好であるが、製造コストが高いという問題点があった。本発明はかかる状況に鑑みなされたもので、両面フレキシブル金属張積層板に用いる接着剤として、ガラス転移点が２００～２５０℃であるポリイミド系接着剤を用いることで、耐熱性や多層化時の接続信頼性に優れ、更にコストや量産性にも優れた両面フレキシブル金属張積層板を提供することを目的とする。
【０００５】
【課題を解決するための手段】本発明者らは、特性低下の原因である従来のアクリル系やエポキシ系接着剤に代わるものについて鋭意検討した結果、ガラス転移点が２００～２５０℃のポリイミド系接着剤を用いることにより前記目的が達成されること見出し、この知見に基づいて本発明を完成するに至った。
【０００６】すなわち、本発明は両面が接着処理されたポリイミドフィルムの両面に、ガラス転移点が２００～２５０℃のポリイミド系接着剤からなり、厚さがポリイミドフィルムの厚さの５～５０％である接着剤層を介して金属箔を積層したことを特徴とする両面フレキシブル金属張積層板を提供するものである。
【０００７】本発明の両面フレキシブル金属張積層板は、接着剤のガラス転移点が従来のものに比べ高いために、２００℃においても金属箔との接着強度の低下が少なく、かつ３５０℃のはんだ浴浸漬でも６０秒間以上異常は認められなかった。
【０００８】本発明で用られるポリイミドフィルムとしては、寸法安定性を確保するために、導体金属と同程度の線熱膨張係数を有する低熱膨張性ポリイミドフィルムが好ましく用いられる。このようなポリイミドフィルムとしてはユーピレックスＳ（宇部興産（株）製）、アピカルＮＰＩ（鐘淵化学工業（株）製）などが挙げられるが、線熱膨張係数が５０～２５０℃において、２．５×１０$^{-5}$以下のものが好ましく用いられる。線熱膨張係数がこれを超えるポリイミドフィルムを用いると、回路加工後の寸法変化率が大きくなり、また、熱サイクル試験における接続信頼性が低下することがある。ポリイミドフィルムの厚さは通常１２．５～７５μｍのものが好適に用いられる。
【０００９】このポリイミドフィルムの両面には接着処理が施されている。接着処理の方法としては、ブラシ研磨、サンドブラスト処理などの機械的処理とカップリング剤処理、アルカリ処理、コロナ処理、プラズマ処理などの化学的処理がある。中でも酸素プラズマ処理が効果の面から最も好ましい。
【００１０】本発明の両面フレキシブル金属張積層板のポリイミドフィルムの両面には接着剤層を介して金属箔が積層されている。この接着剤層はガラス転移温度が２００～２５０℃のポリイミド系接着剤からなっている。接着剤のガラス転移温度が２００℃未満であると得られる両面フレキシブル金属張積層板の、耐熱性、多層化時の接続信頼性が低下し、２５０℃を超えるとポリイミドフィルムと金属箔の接着が困難となる。金属箔としては、厚さ８～１０５μｍの銅箔が好適に用いられる。
【００１１】本発明で用いられるポリイミド系接着剤としては２，２－ビス［４－（ｐ－アミノフェノキシ）フェニル］プロパン等のジアミノ化合物とベンゾフェノンテトラカルボン酸等のテトラカルボン酸等を反応させて得られるポリアミド酸をイミド化してなるもの、あるい

は前記ポリアミド酸にN，N′－（メチレン　ジ－ｐ－フェニレン）ビスマレイミド等のビスマレイミド化合物を配合し、イミド化してなるもの等が挙げられる。

【００１２】上記接着剤層の厚さは、ポリイミドフィルムの厚さの５～５０%の厚さとする。接着剤層の厚さとがポリイミドフィルムの厚さの５０%を超えると得られるフレキシブル金属張積層板の接続信頼性が低下する。好ましくはポリイミドフィルムの厚さの５～３０%とする。この理由としては、ポリイミド系接着剤のＺ軸方向の熱膨張係数は、５０～２５０℃において、６．１×１０$^{-5}$／℃であり、従来のエポキシ系やアクリル系に比べると１桁以上小さいが、銅やその他の金属箔と同等まで小さくするのは困難であるために、絶縁層全体における接着剤層の占める割合が増えると、絶縁層全体のＺ軸方向熱膨張係数が大きくなってしまい寸法精度や接続信頼性の点で問題となるためである。

【００１３】本発明の接着剤層の形成は、接着処理したポリイミドフィルムの両面に、ポリイミド系接着剤組成物を均一に塗布し、次いで、例えば１５０℃１０分，２００℃３０分乾燥する。乾燥後のそれぞれの接着剤層の厚さは、ベースフィルムのポリイミドフィルムとの比で５～５０%の厚さになるようにする。また、金属箔上にポリイミド系接着剤組成物を上記厚さになるように均一に塗布しておいてもよい。

【００１４】最後に、ポリイミドフイルムと金属箔を接着剤層を介して熱圧着する。この際の温度は、接着剤のガラス転移点以上が必要であり、好ましくは２４０～２６０℃である。また、圧力は２０ｋｇｆ／ｃｍ^{2}以上が好ましいが特に限定されるものではない。時間及び圧着方法について特に限定はなく、実際の特性を観察しながら決定する。ロールラミネートによる連続圧着も可能であり、非常に有用である。

【００１５】上記のようにして得られた両面フレキシブル金属張積層板は、金属箔の引き剥がし強さが２００℃において０．８ｋｇｆ／ｃｍ以上、はんだ耐熱性が３５０℃で６０秒間以上であり、耐熱性、高温時の接着力及び多層化時の接続信頼性に優れたものである。

【００１６】

【実施例】以下、本発明を実施例に基づいて詳細に説明するが、本発明はこれに限定されるものではない。

合成例１

熱電対、撹拌機、窒素吸込口、コンデンサーを取付けた６０１ステンレス製反応釜に、毎分３００ｍｌの乾燥窒素を流しながら２，２－ビス〔４－（ｐ－アミノフェノキシ）フェニル〕プロパン４．２０ｋｇとN，Ｎ－ジメチルアセトアミド４２．５ｋｇを入れ撹拌しＢＡＰＰを溶解した。この溶液をウォータージャケットを用いて２０℃以下に冷却しながら、ベンゾフェノンテトラカルボン酸３．３０ｋｇを徐々に加え重合反応させ粘ちょうなポリアミド酸ワニスを得た。

【００１７】以後の塗膜作業性を良くする目的から、このワニスの回転粘度が約２００ポイズになるまで８０℃でクッキングを行った。このワニスの中に生成しているポリアミド酸は７．５ｋｇ（１５ｗｔ%）である。このポリアミド酸から得られたポリイミドのガラス転移温度は２４５℃であった。

【００１８】次いでこのポリアミド酸ワニスを４０℃に冷却し、不揮発ポリアミド酸１００重量部に対し４０重量部にあたる３．００ｋｇのN，N′－（メチレン　ジ－ｐ－フェニレン）ビスマレイミドを添加溶解しポリイミド系接着剤組成物を得た。

【００１９】実施例１

２５μｍのポリイミドフィルム（宇部興産（株）製、商品名ＵＰＩＬＥＸ－Ｓ）の両面に圧力０．１ｔｏｒｒ，投入電力１５ｋＷ，処理時間５秒の条件で酸素プラズマ処理を行い、両面に合成例１で合成したポリイミド系接着剤組成物を、それぞれ乾燥後の厚さが１０μｍになるように塗布し、１５０℃／１０分，２００℃／３０分の条件で乾燥した。接着剤中の残留揮発分は０．３重量%だった。

【００２０】次に、上記のポリイミドフィルムの接着剤面と３５μｍの銅箔（日本鉱業（株）製、商品名ＢＨＹ）の粗化面とを対向させて、ポリイミドフィルムと銅箔を重ね合わせ、２５０℃／３０分，４０ｋｇｆ／ｃｍ^{2}の積層条件でプレスし、両面フレキシブル銅張積層板を得た。金属箔との引き剥がし強さは、室温で１．２ｋｇｆ／ｃｍ，２００℃でも１．２ｋｇｆ／ｃｍであり、高温時の接着力低下は認められず、また、３５０℃、３分間のはんだ浴試験でも異常は認められなかった。

【００２１】実施例２

３５μｍの銅箔（日本鉱業（株）製、商品名ＢＨＹ）の粗化面に合成例１で合成したポリイミド系接着剤組成物を、乾燥後の厚さが１０μｍになるように塗布し、１５０℃／１０分，２００℃／３０分の条件で乾燥した。接着剤中の残留揮発分は０．３重量%だった。

【００２２】次に、両面に実施例１と同条件で酸素プラズマ処理を行った２５μｍのポリイミドフィルム（宇部興産（株）製、商品名ＵＰＩＬＥＸ－Ｓ）の両面の酸素プラズマ処理面と接着剤組成物塗布面を対向させ、ポリイミドフィルムと銅箔を重ね合わせ、２５０℃／３０分，４０ｋｇｆ／ｃｍ^{2}の積層条件でプレスし、両面フレキシブル銅張積層板を得た。金属箔との引き剥がし強さは、室温で１．３ｋｇｆ／ｃｍ，２００℃でも１．２ｋｇｆ／ｃｍであり、３５０℃、３分間のはんだ浴試験でも異常は認められなかった。

【００２３】比較例１

接着剤組成物としてエポキシ／ＮＢＲ系接着剤（日立化成ポリマー（株）製、商品名Ｈ－２７６６　ガラス転移温度６０℃）を用い、乾燥条件を１２０℃／１０分及び積層条件を１７０℃／６０分とした他は実施例１同様に

して両面フレキシブル金属張積層板を得た。金属箔との引き剥がし強さは、室温では１．５ｋｇｆ／ｃｍであったが、２００℃では金属箔が剥離してしまった。また、３５０℃のはんだ浴試験においても金属箔が剥離した。

【００２４】比較例２

接着剤の塗布厚を３０μｍとした他は、実施例１と同様にして両面フレキシブル金属張積層板を得た。引き剥がし強さ、はんだ浴試験とも異常は認められなかったが、寸法変化率が－０．１５％と大きく、多層化積層時に支障をきたした。また、Ｚ軸方向の熱膨張係数が８．０×10^{-5}／℃と大きく熱サイクル試験時（－６５℃／３０分←→１２５℃／３０分）において、クラックを生じた。

【００２５】

【発明の効果】本発明によれば、高温時の引き剥がし強さ及びはんだ耐熱性に極めて優れた両面フレキシブル金属張積層板を提供することができる。これにより、多層化後も接続信頼性が高く、低コストでかつ優れた特性のフレキシブル印刷配線板の製造が可能になった。

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